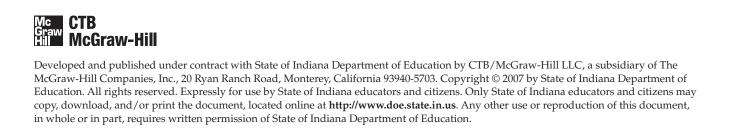
Teacher's Scoring Guide

STE

Grade 5
Science

Fall 2007



INTRODUCTION

During the fall of 2007, Indiana students in grades 3 through 10 participated in the administration of *ISTEP+*. The test for *ISTEP+* Fall 2007 consisted of a multiple-choice section and an applied skills section. For the fall testing, the multiple-choice section was machine-scored. The applied skills section, which consisted of open-ended questions, was hand-scored.

The test results for both the multiple-choice and the applied skills sections were returned to the schools in late November 2007. Copies of student responses to the open-ended questions were returned to the schools in early December 2007. It is the expectation of the Indiana Department of Education that schools will take this opportunity to invite students and parents to sit down with teachers to discuss the results. To support this endeavor, the Indiana Department of Education has prepared the following *Teacher's Scoring Guide*. The purpose of this guide is to help teachers to:

- understand the methods used to score the ISTEP+ Fall 2007 applied skills section, and
- discuss and interpret these results with students and parents.

In order to use this guide effectively, you will also need the Student Report and a copy of the student's work.

There are three scoring guides for Grade 5, English/Language Arts, Mathematics, and Science. In this Science guide, you will find:

- an introduction,
- a list of the Science Grade 4 Indiana Academic Standards,*
- rubrics (scoring rules) used to score the open-ended questions,
- anchor papers that are actual examples of student work (transcribed in this guide for clarity and ease of reading), and
- descriptions of the ways in which the response meets the rubric criteria for each of the score points.

When you review the contents of the scoring guide, keep in mind that this guide is an overview. If you have questions, write via e-mail (istep@doe.state.in.us) or call the Indiana Department of Education at (317) 232-9050.

^{*} Because ISTEP+ is administered early in the fall, the Grade 5 Science assessment is based on the academic standards through Grade 4.

INTRODUCTION TO THE SCIENCE APPLIED SKILLS SECTION

The applied skills section that students responded to this past fall in Grade 5 allowed the students to demonstrate their understanding of Science in a variety of ways, such as making observations, measuring with a ruler, completing a graph, analyzing data, or applying concepts.

STRUCTURE

The applied skills section for Grade 5 Science was given in Test 11, which consisted of eight open-ended questions.

SCORING

Each open-ended question was scored according to its own rubric. A rubric is a description of student performance that clearly articulates the requirements for each of the score points. Scoring rubrics are essential because they ensure that all papers are scored objectively. Each rubric for this administration of the *ISTEP+* Grade 5 Science assessment has a maximum possible score of two score points.

NOTE: Images of the questions and student work have been reduced to fit the format of this guide.

Rubrics are established prior to testing to describe the performance criteria for each score point. The performance criteria determine the number of score points possible for each question. This process ensures that all responses are judged objectively.

- 1. Students should not be penalized for:
 - spelling or grammar errors
 - using abbreviations; for example, cm or centimeters would be acceptable
- 2. Students should be given credit for:
 - answers not written on the answer line (however, in some cases, because a question may consist of different parts, placement of an answer on the answer line is necessary to determine to which part the student intended to respond)

CONDITION CODES

If a response is unscorable, it is assigned one of the following condition codes:

- A Blank/No response/Refusal
- B Illegible
- C Written predominantly in a language other than English
- D Insufficient response/Copied from text
- E Response not related to test question or scoring rule

SCIENCE GRADE 4 INDIANA ACADEMIC STANDARDS

☐ The Nature of Science and Technology

Students, working collaboratively, carry out investigations. They observe and make accurate measurements, increase their use of tools and instruments, record data in journals, and communicate results through chart, graph, written, and verbal forms.

□ Scientific Thinking

Students use a variety of skills and techniques when attempting to answer questions and solve problems. They describe their observations accurately and clearly, using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, explain, and justify both information and numerical functions.

☐ The Physical Setting

Students continue to investigate changes of Earth and sky and begin to understand the composition and size of the universe. They explore, describe, and classify materials, motion, and energy.

☐ The Living Environment

Students learn about an increasing variety of organisms—familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among them. They explore how organisms satisfy their needs in their environments.

□ The Mathematical World

Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.

□ Common Themes

Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result. They question why change occurs.

Test 11—Question 1: The Physical Setting

would have to happen to cause the day-and-night cycl #IORE than 24 hours to occur?	e on Earth to

Key Elements:

• Earth rotates on its axis.

AND

• Earth would have to rotate more slowly.

Rubric:

2 points Two key elements1 point One key element

SCORE POINT 2

1 Explain why the day-and-night cycle on Earth occurs.

the Earth spins and on one side the sun shines and on the other

side the sun does not

What would have to happen to cause the day-and-night cycle on Earth to take MORE than 24 hours to occur?

the earth would have to rotate slower

Test 11—Question 1 Score Point 2

This response correctly explains why the dayand-night cycle on Earth occurs. The student correctly explains what would have to happen to cause the day-and-night cycle on Earth to take more than 24 hours to occur. The response receives a Score Point 2.

SCORE POINT 1

1 Explain why the day-and-night cycle on Earth occurs.

the earth rotates on its two imaginary poles called an axis

What would have to happen to cause the day-and-night cycle on Earth to take MORE than 24 hours to occur?

a solar eclipse

Test 11—Question 1 Score Point 1

This response correctly explains why the day-and-night cycle on Earth occurs. However, the student incorrectly explains what would have to happen to cause the day-and-night cycle on Earth to take more than 24 hours to occur. Therefore, this response receives a Score Point 1.

SCORE POINT 0

1 Explain why the day-and-night cycle on Earth occurs.

So we can sleep and go to school to learn.

What would have to happen to cause the day-and-night cycle on Earth to take MORE than 24 hours to occur?

It would have to move slower a rould the sun.

Test 11—Question 1 Score Point 0

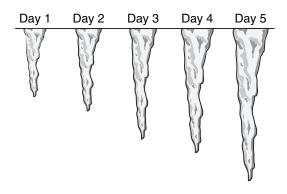
This response incorrectly explains why the dayand-night cycle on Earth occurs and incorrectly explains what would have to happen to cause the day-and-night cycle on Earth to take more than 24 hours to occur. Therefore, this response receives a Score Point 0.

2



Use your ruler to answer this question.

An icicle formed on the edge of a roof. The pictures below show the icicle over five days.



Measure the length, in centimeters, of the icicle for each day. Then record your measurements in the table below.

Length of Icicle Over Time

Day	Length (in centimeters)
1	
2	
3	
4	
5	

Key Elements:

• Any measurements within the range listed for each cell:

Length of Icicle Over Time

Day	Length (in centimeters)
1	2.0-3.0
2	2.5-3.5
3	3.5-4.5
4	4.0-5.0
5	5.0-6.0

NOTE: Although units of measurement are not required to be listed for this item, do not accept a measurement if non-metric units are listed (e.g., inches).

Rubric:

2 points Five measurements

correct

1 point Three or four

measurements correct

Test 11—Question 2 Score Point 2

This response correctly lists measurements within the designated ranges for all five cells of the table. The response receives a Score Point 2.

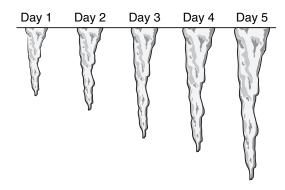
SCORE POINT 2

2



Use your ruler to answer this question.

An icicle formed on the edge of a roof. The pictures below show the icicle over five days.



Measure the length, in centimeters, of the icicle for each day. Then record your measurements in the table below.

Length of Icicle Over Time

Day	Length (in centimeters)
1	2.5 cm
2	3 cm
3	4 cm
4	4.5 cm
5	5.5 cm

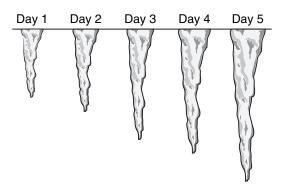
SCORE POINT 1

2



Use your ruler to answer this question.

An icicle formed on the edge of a roof. The pictures below show the icicle over five days.



Measure the length, in centimeters, of the icicle for each day. Then record your measurements in the table below.

Length of Icicle Over Time

Day	Length (in centimeters)
1	1. $\frac{1}{2}$ cm
2	3 cm
3	4 cm
4	$4\frac{1}{2}$ cm
5	$5\frac{1}{2}$ cm

Test 11—Question 2 Score Point 1

This response correctly lists measurements within the designated ranges for only four cells of the table. Therefore, this response receives a Score Point 1.

Test 11—Question 2 Score Point 0

This response correctly lists measurements within the designated ranges for only one cell of the table. Therefore, this response receives a Score Point 0.

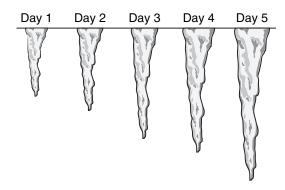
SCORE POINT 0

2



Use your ruler to answer this question.

An icicle formed on the edge of a roof. The pictures below show the icicle over five days.



Measure the length, in centimeters, of the icicle for each day. Then record your measurements in the table below.

Length of Icicle Over Time

Day	Length (in centimeters)
1	4
2	$4\frac{1}{2}$
3	5
4	$5\frac{1}{2}$
5	6

Test 11—Question 3: The Nature of Science and Technology

	often use airple ONE other A				3.
		_		<u> </u>	-
Describe	ONE DISAC	VANTAGE	of traveling	in airplanes.	

Key Elements:

Any one of the following:

- allows faster travel for people
- allows faster travel for cargo
- safer than cars or trains
- other reasonable advantage of traveling in airplanes

AND

Any one of the following:

- causes pollution
- more expensive than other types of transportation
- long lines at airports
- weather delays/cancellations
- other reasonable disadvantage of traveling in airplanes

Rubric:

2 points Two key elements1 point One key element

Test 11—Question 3 Score Point 2

This response correctly describes another advantage of traveling in airplanes. The student correctly describes a disadvantage of traveling in airplanes. The response receives a Score Point 2.

SCORE POINT 2

3 People often use airplanes to travel long distances.

Describe ONE other ADVANTAGE of traveling in airplanes.

You can travel alot faster

Describe ONE DISADVANTAGE of traveling in airplanes. It causes pollution.

Test 11—Question 3 Score Point 1

This response does not describe an advantage of traveling in airplanes (instead the response describes a reason for traveling). However, the student correctly describes a disadvantage of traveling in airplanes. Therefore, this response receives a Score Point 1.

SCORE POINT 1

3 People often use airplanes to travel long distances.

Describe ONE other ADVANTAGE of traveling in airplanes.

to go on a vacation.

Describe ONE DISADVANTAGE of traveling in airplanes. It is to scary to fly.

Test 11—Question 3 Score Point 0

This response does not describe another advantage of traveling in airplanes and does not describe a disadvantage of traveling in airplanes. Therefore, this response receives a Score Point 0.

SCORE POINT 0

3 People often use airplanes to travel long distances.

Describe ONE other ADVANTAGE of traveling in airplanes.

One other advantage is you can ride a boat.

Describe ONE DISADVANTAGE of traveling in airplanes.

One disadvantage is a car.

Test 11—Question 4: The Mathematical World

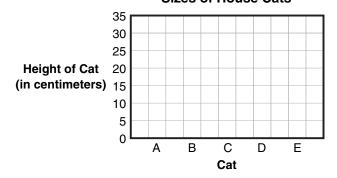
4 Maurice measured the shoulder heights of five different house cats. The table below shows the results.

Sizes of House Cats

Cat	Height of Cat (in centimeters)
Α	31
В	28
С	24
D	21
Е	20

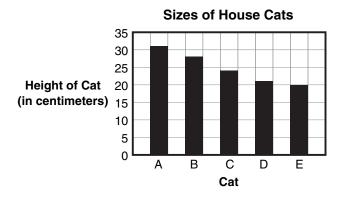
Use the information in the table to construct a BAR GRAPH.





Key Elements:

• All five bars drawn correctly, as shown below:



NOTE: Deduct one score point if graph is not a bar graph (i.e., if a line graph or scatter plot are plotted instead).

Rubric:

2 points Five bars drawn

correctly

1 point Three or four bars

drawn correctly

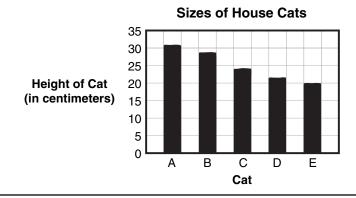
SCORE POINT 2

4 Maurice measured the shoulder heights of five different house cats. The table below shows the results.

Sizes of House Cats

Cat	Height of Cat (in centimeters)
Α	31
В	28
С	24
D	21
Е	20

Use the information in the table to construct a BAR GRAPH.



Test 11—Question 4 **Score Point 2**

This response shows all five bars drawn correctly in the graph. The response receives a Score Point 2.

Test 11—Question 4 Score Point 1

This response shows only four bars drawn correctly in the graph (i.e., the bar for cat C is drawn incorrectly). Therefore, this response receives a Score Point 1.

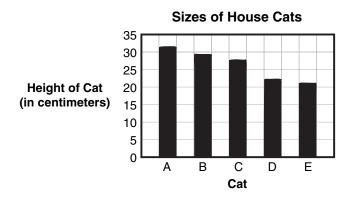
SCORE POINT 1

4 Maurice measured the shoulder heights of five different house cats. The table below shows the results.

Sizes of House Cats

Cat	Height of Cat (in centimeters)
Α	31
В	28
С	24
D	21
Е	20

Use the information in the table to construct a BAR GRAPH.



SCORE POINT 0

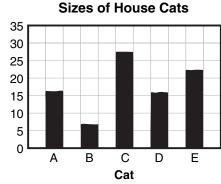
4 Maurice measured the shoulder heights of five different house cats. The table below shows the results.

Sizes of House Cats

Cat	Height of Cat (in centimeters)
Α	31
В	28
С	24
D	21
Е	20

Use the information in the table to construct a BAR GRAPH.





Test 11—Question 4 **Score Point 0**

This response shows none of the bars drawn correctly in the graph. Therefore, this response receives a Score Point 0.

Test 11—Question 5: The Living Environment

5	Scientists were studying an area where ancient humans once lived. They discovered broken pieces of pottery, sharpened flakes of stone, pieces of animal bones, and piles of ash and charcoal.
	Using this information, give TWO different conclusions the scientists could make about the behavior of the ancient humans who lived in this area.
	1)
	2)

Key Elements:

Any two of the following:

- any reasonable conclusion based on evidence of broken pieces of pottery (e.g., they could make pottery, they may have used the pottery for cooking food, etc.)
- any reasonable conclusion based on evidence of sharpened flakes of stone (e.g., they may have used the stones for cutting, they may have hunted using the stones, etc.)
- any reasonable conclusion based on evidence of pieces of animal bones (e.g., they ate meat, they may have domesticated animals, etc.)
- any reasonable conclusion based on evidence of piles of ash and charcoal (e.g., they could make fire, they may have used fire for cooking, etc.)

Rubric:

2 points Two key elements1 point One key element

SCORE POINT 2

5 Scientists were studying an area where ancient humans once lived. They discovered broken pieces of pottery, sharpened flakes of stone, pieces of animal bones, and piles of ash and charcoal.

Using this information, give TWO different conclusions the scientists could make about the behavior of the ancient humans who lived in this area.

1) They made fires.

They hunted.

Test 11—Question 5 Score Point 2

This response correctly gives two different conclusions scientists could make about the behavior of the ancient humans based on the evidence discovered. The response receives a Score Point 2.

SCORE POINT 1

5 Scientists were studying an area where ancient humans once lived. They discovered broken pieces of pottery, sharpened flakes of stone, pieces of animal bones, and piles of ash and charcoal.

Using this information, give TWO different conclusions the scientists could make about the behavior of the ancient humans who lived in this area.

1) They made fire.

They made art on the walls.

Test 11—Question 5 Score Point 1

This response correctly gives one conclusion scientists could make about the behavior of the ancient humans based on the evidence discovered. However, the student gives a conclusion (they made art on the walls) that is not based on the evidence discovered. Therefore, this response receives a Score Point 1.

SCORE POINT 0

5 Scientists were studying an area where ancient humans once lived. They discovered broken pieces of pottery, sharpened flakes of stone, pieces of animal bones, and piles of ash and charcoal.

Using this information, give TWO different conclusions the scientists could make about the behavior of the ancient humans who lived in this area.

1) found stuff from the old old days

2) discovered new stuff that they dint know about

Test 11—Question 5 Score Point 0

This response does not give any conclusions that scientists could make about the behavior of the ancient humans based on the evidence discovered. Therefore, this response receives a Score Point 0.

6 The pictures below show several different animals.











Centipede







Ladybug



Spider

Describe ONE physical feature that some of these animals have in common but that the other animals do NOT have.

In the Group 1 section of the table below, list the names of the animals that have the feature.

In the Group 2 section of the table, list the names of the animals that do NOT have the feature.

Group 1 Have the feature	Group 2 Do NOT have the feature		

Key Elements:

• any valid physical feature that could be used to sort all of these animals into two distinct groups

AND

 all animals are listed and correctly sorted so that the animals listed in group 1 have the feature and the animals listed in group 2 do not have the feature

Rubric:

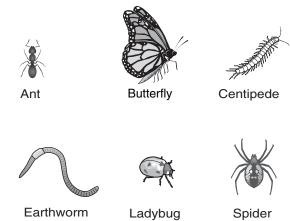
2 points Two key elements1 point One key element

Test 11—Question 6 Score Point 2

The response correctly describes one physical feature that could be used to sort the animals into two distinct groups. The student correctly lists and sorts all the animals based on the feature. The response receives a Score Point 2.

SCORE POINT 2

6 The pictures below show several different animals.



Describe ONE physical feature that some of these animals have in common but that the other animals do NOT have.

Some animals have wings.

In the Group 1 section of the table below, list the names of the animals that have the feature.

In the Group 2 section of the table, list the names of the animals that do NOT have the feature.

Group 1 Have the feature	Group 2 Do NOT have the feature
1. Butterfly 2. Ladybug	 Ant centipede Earthworm spider

SCORE POINT 1

6 The pictures below show several different animals.







Centipede







Earthworm

Spider

Describe ONE physical feature that some of these animals have in common but that the other animals do NOT have.

Ladybug

eyes

In the Group 1 section of the table below, list the names of the animals that have the feature.

In the Group 2 section of the table, list the names of the animals that do NOT have the feature.

Group 1 Have the feature	Group 2 Do NOT have the feature		

Test 11—Question 6 **Score Point 1**

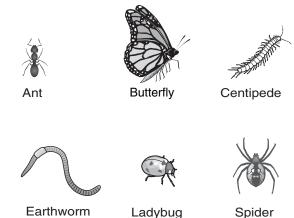
The response correctly describes one physical feature that could be used to sort the animals into two distinct groups. However, the student did not sort the animals based on the feature. Therefore, this response receives a Score Point 1.

Test 11—Question 6 Score Point 0

The response does not describe a physical feature (i.e., "creepy" is a personal opinion rather than a physical feature) and therefore cannot receive credit for sorting the animals based on a physical feature. Therefore, this response receives a Score Point 0.

SCORE POINT 0

6 The pictures below show several different animals.



Describe ONE physical feature that some of these animals have in common but that the other animals do NOT have.

they're creepy

In the Group 1 section of the table below, list the names of the animals that have the feature.

In the Group 2 section of the table, list the names of the animals that do NOT have the feature.

Group 1 Have the feature	Group 2 Do NOT have the feature		
spider	butterfly		
earthworm	ladybug		
centipede	ant		

Test 11—Question 7: Scientific Thinking

7 Derek and Laurel were timed as they ran on the playground. The distance they ran and the amount of time it took them to run that distance were recorded in the table below.

Running Time Results

	Distance (in meters)	Time
Derek	400	1 minute, 45 seconds
Laurel	300	1 minute, 30 seconds

After looking at the information in the table, Laurel said that she ran faster than Derek. What information would make Laurel say this?
After looking at the information in the table, Derek said he ran faster than Laurel. What information would make Derek say this?
What could Derek and Laurel do to find out who is the faster runner?

Key Elements:

Both of the following:

Information that made Laurel say she ran faster

• Laurel ran in a shorter amount of time/Derek ran in a longer amount of time.

Information that made Derek say he ran faster

• Derek ran a longer distance/Laurel ran a shorter distance.

AND

Any one of the following:

- any valid response indicating that Derek and Laurel should run equal distances and race/be timed to determine who is the faster runner
- any valid response indicating that the rate/ speed of each runner should be calculated and compared to determine who is the faster runner

Rubric:

2 points Two key elements

1 point One key element

SCORE POINT 2

7 Derek and Laurel were timed as they ran on the playground. The distance they ran and the amount of time it took them to run that distance were recorded in the table below.

Running Time Results

	Distance (in meters)	Time	
Derek	400	1 minute, 45 seconds	
Laurel	300	1 minute, 30 seconds	

After looking at the information in the table, Laurel said that she ran faster than Derek. What information would make Laurel say this?

The time information becase her times less.

After looking at the information in the table, Derek said he ran faster than Laurel. What information would make Derek say this?

the distance information becase he has got more meters.

What could Derek and Laurel do to find out who is the faster runner? Re-run but this time run the same distance.

Test 11—Question 7 Score Point 2

This response correctly describes the information from the table that supports Laurel's opinion and the information that supports Derek's opinion. The student gives a valid way for Derek and Laurel to determine who is the faster runner. The response receives a Score Point 2.

Test 11—Question 7 Score Point 1

This response correctly describes the information from the table that supports Laurel's opinion and the information that supports Derek's opinion. However, the student does not give a valid way for Derek and Laurel to determine who is the faster runner. Therefore, this response receives a Score Point 1.

SCORE POINT 1

Derek and Laurel were timed as they ran on the playground. The distance they ran and the amount of time it took them to run that distance were recorded in the table below.

Running Time Results

Distance (in meters)			Time	
	Derek	400	1 minute, 45 seconds	
	Laurel	300	1 minute, 30 seconds	

After looking at the information in the table, Laurel said that she ran faster than Derek. What information would make Laurel say this?

laster than Derek. What information would make Laurer say this:
Time
After looking at the information in the table, Derek said he ran faster than Laurel. What information would make Derek say this?
Distance

SCORE POINT 0

7 Derek and Laurel were timed as they ran on the playground. The distance they ran and the amount of time it took them to run that distance were recorded in the table below.

Running Time Results

	Distance (in meters)	Time	
Derek 400		1 minute, 45 seconds	
Laurel	300	1 minute, 30 seconds	

After looking at the information in the table, Laurel said that she ran faster than Derek. What information would make Laurel say this?

It took less time for her to finish.

After looking at the information in the table, Derek said he ran faster than Laurel. What information would make Derek say this?

It took him only 15 seconds longer.

What could Derek and Laurel do to find out who is the faster runner? Look at the time.

Test 11—Question 7 Score Point 0

This response correctly describes the information from the table that supports Laurel's opinion. However, the response does not describe the information from the table that supports Derek's opinion. The student also does not give a valid way for Derek and Laurel to determine who is the faster runner. Therefore, this response receives a Score Point 0.

Test 11—Question 8: The Physical Setting

8	Describe TWO different ways that people can protect themselves during a tornado.
	1)
	2)

Key Elements:

Any two of the following (one key element each):

- seek shelter (e.g., basement, interior room/ hallway, ditch, etc.)
- stay away from windows
- listen to television/radio (for storm information)
- cover head
- other reasonable description of how people can protect themselves during a tornado

Rubric:

2 points Two key elements1 point One key element

SCORE POINT 2

- 8 Describe TWO different ways that people can protect themselves during a tornado.
 - People should go down to your basement during a tornado.
 - Keep away from the window during a tornado.

Test 11—Question 8 Score Point 2

This response correctly describes two different ways that people can protect themselves during a tornado. The response receives a Score Point 2.

SCORE POINT 1

- 8 Describe TWO different ways that people can protect themselves during a tornado.
 - 1) Go into a safehouse.
 - Stay in their car if they're driving.

Test 11—Question 8 Score Point 1

This response correctly describes one way that people can protect themselves during a tornado. However, the student also gives an incorrect answer (stay in their car). Therefore, this response receives a Score Point 1.

SCORE POINT 0

- 8 Describe TWO different ways that people can protect themselves during a tornado.
 - 1) People are nice and mean.
 - Tornado kill people

Test 11—Question 8 Score Point 0

This response does not correctly describe any ways that people can protect themselves during a tornado. Therefore, this response receives a Score Point 0.

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Grade 5 Science

Fall 2007 Teacher's Scoring Guide



Indiana Department of Education